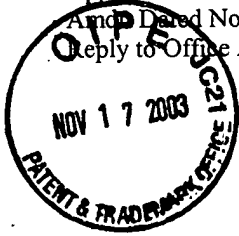


And Dated Nov. 17, 2003

Reply to Office Action of Aug. 20, 2003



AMENDMENTS TO THE CLAIMS

Kindly cancel claims 1, 20 and 22-24, amend claims 2, 5, 14, 15, 16, and 21 and add new claims 25-27 as shown in the listing of claims below. This listing of claims will replace all prior versions, and listings of claims in the application.

LISTING OF CLAIMS

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1 Claim 1. (cancel)

1 Claim 2. (currently amended) ~~The method of claim 1~~ A method for calibrating a frequency
 2 difference between two or more lasers over an extended frequency range, comprising:
 3 tuning the lasers in coordination with respect to one or more readily characterized narrow
 4 frequency ranges to characterize one or more tuning parameters of each of the lasers over
 5 the extended frequency range, wherein tuning the lasers in coordination includes:
 6 calibrating the frequency difference with respect to the one or more tuning parameters
 7 over a first narrow frequency range;
 8 calibrating the frequency difference with respect to the one or more tuning parameters
 9 over a second narrow frequency range; and
 10 coordinating the resulting frequency difference calibrations for the first and second
 11 narrow frequency ranges to calibrate the frequency difference with respect to the one or
 12 more tuning parameters over the extended frequency range.

1 Claim 3. (currently amended) The method of claim [[1]] 2, wherein the first and second narrow
 2 ranges frequency have at least one common calibration point

1 Claim 4. (currently amended) The method of claim [[1]] 2, wherein the one or more tuning
 2 parameters includes a temperature of at least one of the lasers.

1 Claim 5. (currently amended) ~~The method of claim 1, wherein tuning the lasers in coordination~~
 2 ~~with respect to one or more readily characterized narrow frequency ranges to characterize~~
 3 ~~one or more tuning parameters of each of the lasers over the extended frequency range~~

4 includes A method for calibrating a frequency difference between two or more lasers
5 over an extended frequency range, comprising::

6 measuring, with a frequency detector, a first value of a frequency difference between a
7 signal from a first laser and a signal from a second laser, wherein the first frequency
8 difference value lies within a finite range of the frequency detector;

9 fixing a parameter of the first laser to fix a frequency of the first laser;

10 varying a parameter of the second laser to vary a frequency of the second laser;

11 for one or more values of the second laser parameter, measuring, with the frequency
12 detector, a second value of the frequency difference between the signal from the first
13 laser and the signal from the second laser, wherein a frequency difference range between
14 the first and second frequency difference values lies within the finite range of the
15 frequency detector;

16 fixing the second laser parameter to fix the frequency of the second laser;

17 varying the first laser parameter to vary the frequency of the first laser; and

18 for one or more values of the first laser parameter, measuring, with the frequency
19 detector, a third value of the frequency difference between the signal from the first laser
20 and the signal from the second laser, wherein a frequency difference range between the
21 second and third frequency difference values lies within the finite range of the frequency
22 detector, and wherein a frequency difference range between the first and third frequency
23 difference values extends beyond the finite range of the frequency detector.

1 6. (original) The method of claim 5 wherein the frequency difference range between the first and
2 second frequency difference values is substantially the same as the finite range of the
3 frequency detector.

1 7. (original) The method of claim 5 wherein the frequency difference range between the second
2 and third frequency difference values is substantially the same as the finite range of the
3 frequency detector, whereby the frequency difference range between the first and third
4 frequency difference values is approximately twice the finite range of the frequency
5 detector.

- 1 8. (original) The method of claim 5, further comprising storing one or more pairs of values of the
2 first and second laser parameters and one or more corresponding frequency difference
3 values.
- 1 9. (original) The method of claim 5 further comprising determining from the first, second and
2 third values of the frequency difference one or more calibrated frequency difference
3 values, wherein each of the one or more frequency difference values corresponds to
4 particular pair of values for the parameters of the first and second lasers.
- 1 10. (original) The method of claim 9 wherein one or more of the first and second laser
2 parameters is a laser temperature.
- 1 11. (original) The method of claim 10 wherein the calibrated frequency difference values cover a
2 frequency difference range that is greater than the finite range of the frequency detector.
- 1 12. (currently amended) The method of claim [[1]] 2, wherein tuning the lasers in coordination
2 with respect to one or more readily characterized narrow frequency ranges to characterize
3 one or more tuning parameters of each of the lasers over the extended frequency range
4 includes:
5 fixing a tuning parameter of a first laser;
6 varying a tuning parameter of a second laser,
7 measuring a frequency difference value between the first and second lasers that lies
8 within a finite range ; and
9 associating a calibrated frequency difference value with a pair of values of the tuning
10 parameters of the lasers.
- 1 13. (currently amended) The method of claim [[1]] 2, wherein the frequency of at least one of the
2 lasers is tuned by changing a temperature of the laser.
- 1 14. (currently amended) A computer readable medium having embodied therein a set of
2 computer readable instructions for implementing a method for calibrating two or more
3 lasers over an extended frequency range, the method comprising:

4 tuning the lasers in coordination with respect to one or more readily characterized narrow
5 frequency ranges to characterize one or more tuning parameters of each of the lasers over
6 the extended frequency range

7 wherein tuning the lasers in coordination includes:

8 calibrating the frequency difference with respect to the one or more tuning parameters
9 over a first narrow frequency range;

10 calibrating the frequency difference with respect to the one or more tuning parameters
11 over a second narrow frequency range; and

12 coordinating the resulting frequency difference calibrations for the first and second
13 narrow frequency ranges to calibrate the frequency difference with respect to the one or
14 more tuning parameters over the extended frequency range.

1 15. (currently amended) An apparatus for calibrating a frequency difference between a first laser
2 and a second laser, the apparatus comprising:

3 ~~means for tuning the lasers in coordination with respect to one or more readily~~
4 ~~characterized narrow frequency ranges to characterize one or more tuning parameters of~~
5 ~~each of the lasers over the extended frequency range~~

6 means for calibrating the frequency difference with respect to the one or more tuning
7 parameters over a first narrow frequency range;

8 means for calibrating the frequency difference with respect to the one or more tuning
9 parameters over a second narrow frequency range; and

10 means for coordinating the resulting frequency difference calibrations for the first and
11 second narrow frequency ranges to calibrate the frequency difference with respect to the
12 one or more tuning parameters over the extended frequency range.

1 16. (currently amended) An apparatus for calibrating a frequency difference between a first laser
2 and a second laser, the apparatus comprising, comprising:

3 a first tuning controller coupled to the first laser;

4 a second tuning controller coupled to the second laser;

5 an optical coupler optically coupled to the first laser and the second laser;

6 a frequency detector coupled to the optical coupler; and

7 a controller coupled to the frequency detector and the first and second tuning controllers,
8 wherein the controller includes a processor and a memory, the memory containing a set
9 of instructions that are executable by the processor, the set of instructions implementing a
10 method for calibrating a frequency difference between the first and second lasers over an
11 extended frequency range, the method including
12 ~~tuning the lasers in coordination with respect to one or more readily characterized narrow~~
13 ~~frequency ranges to characterize one or more tuning parameters of each of the lasers over~~
14 ~~the extended frequency range~~
15 calibrating a frequency difference between the first and second lasers with respect to the
16 one or more tuning parameters of the first and/or second laser over a first narrow
17 frequency range that is within a frequency range of the detector;
18 calibrating a frequency difference between the first and second lasers with respect to the
19 one or more tuning parameters over a second narrow frequency range that is within the
20 frequency range of the detector and that is different from the first narrow frequency
21 range; and
22 coordinating the resulting frequency difference calibrations for the first and second
23 narrow frequency ranges to calibrate the frequency difference between the first and
24 second lasers with respect to the one or more tuning parameters over an extended
25 frequency range that is greater than the frequency range of the detector.

1 17. (original) The apparatus of claim 16 wherein the frequency detector includes a local detector
2 optically coupled to the optical coupler, a phase locked loop coupled to the local detector
3 and the controller, an integrator coupled to the phase locked loop and the controller, a
4 direct digital synthesizer coupled to the phase locked loop and the controller, and a
5 crystal oscillator coupled to the direct digital synthesizer.

1 18. (original) The apparatus of claim 17 wherein the crystal oscillator is NIST traceable.

1 19. (original) The apparatus of claim 17 wherein the frequency detector further includes a pre-
2 scaler coupled between the local detector and the phase locked loop.

1 20. (cancel)

1 21. (currently amended) An optical signal generator apparatus, comprising:

2 a first laser;

3 a second laser;

4 a first tuning controller coupled to the first laser;

5 a second tuning controller coupled to the second laser;

6 an optical coupler optically coupled to the first laser and the second laser;

7 a frequency detector coupled to the optical coupler; and

8 a controller coupled to the frequency detector and the first and second tuning controllers,

9 wherein the controller includes a processor and a memory, the memory containing a

10 instructions that are executable by the processor, the set of instructions implementing a

11 method for calibrating a frequency difference between the first and second lasers over an

12 extended frequency range, the method including

13 ~~tuning the lasers in coordination with respect to one or more readily characterized narrow~~

14 ~~frequency ranges to characterize one or more tuning parameters of each of the lasers over~~

15 ~~the extended frequency range~~

16 calibrating a frequency difference between the first and second lasers with respect to the

17 one or more tuning parameters of the first and/or second laser over a first narrow

18 frequency range that is within a frequency range of the detector;

19 calibrating a frequency difference between the first and second lasers with respect to the

20 one or more tuning parameters over a second narrow frequency range that is within the

21 frequency range of the detector and that is different from the first narrow frequency

22 range; and

23 coordinating the resulting frequency difference calibrations for the first and second

24 narrow frequency ranges to calibrate the frequency difference between the first and

25 second lasers with respect to the one or more tuning parameters over an extended

26 frequency range that is greater than the frequency range of the detector.

1 22. (cancel)

1 23. (cancel)

1 24. (cancel)

25. (newly presented) The apparatus of claim 21 wherein the frequency detector includes a local detector optically coupled to the optical coupler, a phase locked loop coupled to the local detector and the controller, an integrator coupled to the phase locked loop and the controller, a direct digital synthesizer coupled to the phase locked loop and the controller,
5 and a crystal oscillator coupled to the direct digital synthesizer.
26. (newly presented) The apparatus of claim 25 wherein the frequency detector further includes a pre-scaler coupled between the local detector and the phase locked loop.
27. (newly presented) The apparatus of claim 25 wherein the crystal oscillator is NIST traceable.